69055

18.1285

S/078/60/005/03/020/048
B004/B002

AUTHORS: Ageyev, N. V., Rogachevskaya, Z. M.

TITLE: Stability of the β-Phase in Titanium - Vanadium - Molybdenum Alloys

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 3, pp 619-621 (USSR)

ABSTRACT: On the basis of published data (Refs 1-4), the authors assumed that the stabilization of the homogeneous β-phase takes place in Ti-Mo-V alloys whose composition lies below the line which in the diagram (Fig 1) connects the binary alloy of Ti with 14% Mo and with 20% of V. The alloys were melted in the arc in a He atmosphere from Ti obtained by the magnesium-thermit process from molybdenum powder and vanadium. The analyses of raw materials are given in table 1, the alloys in table 2. Chilling took place after heating to 900° by 7° - 10° water. The alloys were metallographically and radiographically (RKU camera) analyzed. The hardness was determined by means of the Vickers apparatus. Figure 2 shows diagrams giving the stability of the β-phase in alloys of different composition when heating to 100°-600°. The highest stability of the 21.12% of Mo and 9.72% of V alloy is at 100°-400°. Vanadium additions to about 20% have but little influence on the stability of the β-phase, which, however, increases with rise in the molybdenum content. The decomposition of the β-phase of Ti-Mo-V alloys

Card 1/2

18.4000

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AUTHORS: Ageyev, N. V., Fogel', A. A., Sidorova, T. A., Trapeznikov, V. A.

TITLE: Melting Chromium in a Suspended State

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 2, pp 332-337 (USSR)

ABSTRACT: The use of chromium as a base for heat-resistant alloys presents difficulties due to the brittleness of this metal caused by various impurities. One of the authors (A, A. Fogel, Izv. AN SSSR, OTN, 1959, Vol 2, p 24: Experimental Technique and Methods of Investigation at High Temperatures (Eksperimental'naya tekhnika i metody issledovaniy pri vysokhkikh temperaturakh) publ. by AN SSSR, 1959, p 478) developed a method of melting chromium which dispensed with the use of a crucible and avoided in this manner the contamination of the metal with mineral and gaseous impurities. The metal was kept suspended in an electromagnetic field, and melted by induction heating

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000100520002-1"

Melting Chromium in a Suspended State

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in purified helium atmosphere. The melting apparatus was fed by a standard electronic generator type LGPZ-60 with a frequency of 200,000 hertz. The initial vacuum in the melting chamber before the introduction of helium was from $3 \cdot 10^{-3}$ to $5 \cdot 10^{-6}$ mm Hg, depending on the conditions of the experiment. To avoid volatilization of the metal, the melting was made under 1.1-1.2 atm helium pressure. The gas was carefully purified by passing it through a adsorbing filter filled with activated carbon and silica gel, cooled down to the boiling point of liquid nitrogen. Chromium samples were prepared from electrolytically refined metal, or from metal purified by means of the iodide method, designated in this abstract as "iodide chromium." Little spheres (d - about 16 mm; weight, 12-1[illegible] g) were compressed from the above materials and degassed before melting by slow heating in high vacuum (about $10^{-[illegible]}$ mm Hg). The metal was maintained suspended in the magnetic field until fully molten; when the field was switched

Card 2/4

off, the metal dropped into a copper casting mold. From 100 cast samples, 25% showed a lower content of nitrogen as compared with the initial content, 73% showed no changes, and 2% showed a higher than initial nitrogen content. The electrolytic chromium used in the experiments contained: O, 0.0084-0.013%; N, 0.008-0.0108%; H, about 0.001%; C, 0.020-0.025%; S, 0.003-0.004%; Si, 0.040%; Fe, 0.030%; Al, 0.01-0.015%; Mn, 0.003%; Ni, 0.0007%; Cu, 0.001-0.004%; Ti, 0.006%; Co, 0.001%. The compressed spheres showed 0.0103-0.0122% oxygen on the surface, and 0.0082-0.0092% near the center; nitrogen content was respectively 0.012% and 0.0073%. The melting took 105 sec, and the O and N content inside the cast samples was, respectively, 0.0068-0.0110%, and 0.0030-0.0069%, i.e., the O and N content did not increase during the melting and casting. Similar results were obtained with the iodide chromium (about 0.005% oxygen, and about 0.006% nitrogen inside the cast samples). Hardness of the cast samples

(Rockwell scale B converted to Brinell) was 115-116 kg/mm^2 for the electrolytic, and 108-110 kg/mm^2 for the iodide chromium. Tensile strain of the electrolytic chromium castings was determined in an IM-4P type machine in the range of 45-400° C. The yield point was reached above 250° C, but even at 450° C the tensile strain was only 3%. Compression tests showed that the point of transition from plastic to brittle state (at 150-175° C) was identical for both the electrolytic and the iodide chromium casts. There are 5 figures; and 5 Soviet references.

ASSOCIATION: A. A. Baykov Institute of metallurgy, Academy of Sciences USSR (Institut metallurgii imeni A. A. Baykova AN SSSR)

SUBMITTED: June 6, 1959

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~~5(1), 18(6)~~

S/020/60/130/06/032/059

AUTHORS: Ageyev, N. V., Corresponding Member B011/B015
AS USSR, Tavadze, F. N., Kartvelishvili, Yu. M.

TITLE: On the Production of Pure Chromium Chlorides 21

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 6, pp 1294 - 1297 (USSR)

ABSTRACT: To obtain chromium in the highest possible degree of purity the authors recommend the production of pure chromium chlorides from electrolytic chromium by chloride distillation in a chlorine current, and subsequent reduction with alkali metals or alkaline-earth metals. In this paper they deal with the production of pure chromium chlorides. The following reactions are possible between metallic chromium and chlorine: $2Cr + 3Cl_2 \rightarrow 2CrCl_3$ (1); $Cr + Cl_2 \rightarrow CrCl_2$ (2); $2CrCl_3 + Cr \rightarrow 3CrCl_2$ (3). The authors calculated the free energies and equilibrium constants of these reactions from standard data. The results (temperature dependence of the free energies and constants) are graphically shown on figures 1 and 2. The thermodynamic determination shows that in the temperature range

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On the Production of Pure Chromium Chlorides S/020/60/130/06/032/059
B011/B015

investigated reaction (1) is most likely to occur whereas reaction (3) is most unlikely. Metallic chromium was supplied by the Institut prikladnoy khimii i elektrokhimii AN GruzSSR (Institute of Applied Chemistry and Electrochemistry of the Academy of Sciences of the Gruzinskaya SSR). Figure 3 shows the apparatus for the production of pure chromium chlorides. The procedure may be divided into three sections: (a) degasification of chromium; (b) chlorination of chromium; (c) purification of the chlorides produced by sublimation. These three stages are discussed in detail. Degasification at 400-450° in a vacuum of 10^{-4} mm during 1.0-1.5 h was sufficient to eliminate the entire hydrogen. Chlorination is effective at 595-605°. The chlorination time is to a considerable extent determined by the rate of chlorine addition and the amount of weighed chromium portion. Chlorination took about 50 minutes at a chromium quantity of 20-30 g. At a slow chlorine passage $CrCl_2$ is produced. It is necessary to purify the chromium chlorides under the exclusion of air and steam in vacuum or in pure chlorine because the chromium trichloride vapors oxidize easily in the air. $CrCl_3$ dissociates above 1300°, signs of dissociation are, however,

Card 2/3

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18.7500

S/020/60/135/002/016/036
B016/B052

AUTHORS: ~~Ageyev, N. V.,~~ Corresponding Member of the AS USSR and Shekhtman, V. Sh.

TITLE: The Nature of Sigma Phases

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 2, pp. 309-311

TEXT: The authors investigated the order of sigma phases in the systems Cr-Re, Mn-Re, and Re-Fe. They studied annealed binary alloys with 37 at% Cr (the sample was obtained from Professor Ye. M. Savitskiy's laboratory), 47.7 at% Mn, and 55 at% Fe. According to microstructural and X-ray analyses, these alloys belong to the single-phase regions of σ-phases in the state diagram. Accordingly, formulas were chosen for the calculation of structural amplitudes which, on the basis of crystallochemical data, are ascribed to these compounds with all reservations: $Re_{18}Cr_{12}$, $Re_{16}Mn_{14}$, $Re_{12}Fe_{18}$. Table 1 shows the variants of ordered atomic distribution in the

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The Nature of Sigma Phases

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compounds concerned. These variants follow the symmetry of space group $P4_2/mnm$ to which the structure of σ-phases belongs. The authors' calculations showed that in most cases a distinction between statistical and ordered distributions of atoms is possible on the basis of the interrelations of chosen lines. However, in the case of the Re-Fe alloy, it was also necessary to study lines (311) and (002). Their intensities were determined by a УРС-50И (URS-50I) diffractometer with an МСТР-4 (MSTR-4) counter. The curves were recorded by an ЭПП-09 (EPP-09) potentiometer. A comparison between experiment and calculation shows that the above-mentioned alloys are ordered. The atomic distribution in the cells of σ-phases is correlated to a coordination number and depends on the position of the components in the periodic system. The diagram of Fig. 1 shows the average concentration of Re in the σ-phases of V-Re, Cr-R, Mn-Re, and Fe-Re (Refs. 13-15) as a function of the group number of the second component. It was thus found that the Re content decreases with increasing group numbers. Their explanation of this phenomenon is in accordance with the opinion of other researchers; they arrive at the conclusion that in the four last-mentioned systems, rhenium has an

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The Nature of Sigma Phases

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electron excess as compared to the hypothetical level. The higher the valency of the second component, the smaller the Re amount necessary for an electron concentration characteristic of σ-phases. It is assumed that the formation of σ-phases in the systems Re-Mn and Re-Fe can be explained by a higher metal valency of Re as compared to the elements of the first transition group, although these σ-phases do not follow the well-known rule according to which the elements forming σ-phases lie on both sides of the dividing line between the sub-groups VI A and VII A. There are 1 figure, 2 tables, and 15 references: 6 Soviet, 4 US, 4 British, and 1 Polish.

X

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

SUBMITTED: August 3, 1960

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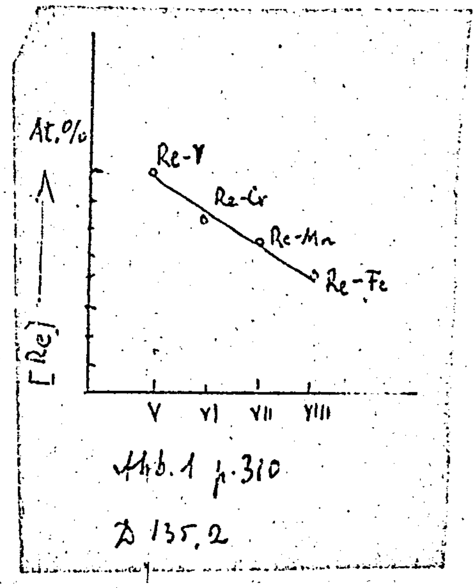
The Nature of Sigma Phases

S/020/60/135/002/016/036
B016/B052

Text to Fig. 1: Re content of the σ-phase as a function of the group number of the second period.



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связанной
периодиче-
езультаты,
оединений
ванадием,
юм могут
представ-
их метал-

Re, Cr –

$Re_{11}Cr_{12}$			$Re_{11}Mn_{14}$						$Re_{12}Fe_{14}$			
2	3	4	1	2	3	4	5	6*	1	2	3*	4
Re Re Re	2 Re 4 Cr 4 Re	2 Cr 4 Re 6 Re	2 Mn 4 Mn 8 Re	2 Mn 4 Re 8 Re	2 Mn 4 Mn 4 Re	2 Re 4 Mn 6 Re	2 Mn 4 Re 4 Re	2 Mn 4 Re 6 Re	2 Fe 4 Fe 8 Fe	2 Fe 4 Fe 8 Fe	2 Fe 4 Re 4 Re	2 Re 4 Fe 6 Re
Cr	4 Cr 8 Re	2 Cr 8 Cr	8 Mn	8 Mn	4 Mn 8 Re	2 Mn 8 Re	4 Mn 4 Re	2 Mn 8 Mn	8 Fe	8 Re	4 Fe 8 Fe	2 Fe 8 Re
Re 4 Cr	4 Re 4 Cr	8 Re	8 Re	4 Re 4 Mn	4 Re 4 Mn	8 Mn	4 Mn 4 Re 4 Mn	8 Re 2 Mn	8 Re	4 Re 4 Fe	4 Re 4 Fe	8 Fe

Tab. 1
p. 310
D 135,2

Text to Table 1: 1 - Position; 2 - coordination number.

Card 5/5

ALISOVA, S.P.;KOLESNIKOVA, T.P.; MARKOVICH, K.P.; PETROVA, L.A.; ROGACHEVSKAYA, Z.M.; AGEYEV, N.V., red.; MOSKVINA, R.Ya., red.; MUKHA, S.Ya., tekhn. red.

[Constitutional diagrams of metal systems published in 1958] Diagrammy sostoianiia metallicheskikh sistem, opublikovannye v 1958 godu. Pod red. N.V.Ageyeva. Moskva, No.4. 1961. 402 p. (MIRA 14:12)
(Phase rule and equilibrium)

S/180/61/000/005/013/018
E193/E383

AUTHORS: Ageyev, N.V., Karpinskiy, O.G. and Petrova, L.A. (Moscow)

TITLE: Stability of the beta-solid solution in titanium-iron-chromium alloys

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 5, 1961, 86 - 89 + 1 plate

TEXT: The object of the present investigation was to study the effect of a third alloying element (iron or chromium) on the stability of the β-phase in binary Ti-Cr or Ti-Fe alloys. The composition of the experimental alloys is given in a table. Hardness measurements, metallographic examination and X-ray diffraction were used to study the phase transformations in specimens prepared from alloys which had been melted in an argon-arc furnace, hot-forged, scalped and homogenized by two-hours treatment at 900 °C. In the first series of experiments the constitution of alloys quenched from 800 and 900 °C was studied. The results are reproduced in Fig. 1, showing the

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E193/E383

Ti-rich corner of the metastable constitution diagram of Ti-Fe-Cr alloys at 900 °C (broken line) and 800 °C (continuous line); the regions above and below these lines comprise alloys consisting, respectively, of β+ω and β-phase only. These results are in agreement with the earlier findings of Ageyev and Petrova (Ref. 5 - DAN SSSR, 1961, v. 138, no. 2, 359-360), according to which alloys with an electron concentration ≥4.2 consist of a single β-phase, whereas those with and electron concentration <4.2 have a two-phase (β+ω) structure. In the second series of experiments, the stability of the metastable β-phase, obtained in alloys 2, 4, 5 and 7 by quenching from 900 °C, was studied on specimens aged at 100 - 400 °C for periods ranging from 15 min to 100 hours. The results are reproduced in Fig. 2, where the constitution of an alloy containing 4.09% Fe and 6.20% Cr is plotted as a function of temperature (t, °C, vertical axis) and time (τ, min, horizontal axis); the continuous lines divide the diagram into three regions: β-phase regions (circles); (β+ω) region (crosses) and (α+β) region (squares). The numbers ascribed to experimental points denote the hardness (kg/mm^2) of the corresponding specimens and the broken lines represent the boundary of the maximum-hardness region. It will be seen that alloys with the ($\beta+\omega$) structure are relatively hard, the hardness increasing with temperature of the ageing treatment. This effect is associated with the degree of dispersion and the quantity of precipitated ω-phase. Laue photographs of the Ti-Fe-Cr alloys, aged at 300 - 400 °C, showed additional reflections (satellite spots) situated near those produced by the matrix lattice. This effect was attributed to a change in the periodicity of the lattice in sub-microscopic crystal regions caused by localized variation of the concentration of supersaturated solid solution during the formation of two-dimensional nuclei of the new phase, whose composition approached that of the precipitated phase in equilibrium with the matrix. The dimension of the Ti-enriched regions were calculated from the angular displacement of the satellite spots and it was found that they depended on the composition of the alloy and the ageing time and temperature, being approximately

150 Å in the 3.19 wt.% Fe and 5.99 wt.% Cr alloy, aged for 15 min at 400 °C, approximately 125 Å in similarly treated 4.09 wt.% Fe and 6.20 wt.% Cr alloy and about 100 Å in the 4.15 wt.% Fe - 6.33 wt.% Cr alloy. The effect of temperature was more pronounced: in the case of the 4.09 wt.% Fe - 6.2 wt.% Cr alloy, it took 15 min for the size of the Ti-enriched zones to reach 125 Å, when aged at 400 °C, and 81 hours when aged at 300 °C. The change in the particle size and quantity of the precipitated ω-phase was accompanied by enrichment of the β-matrix, whose composition tended to approach that of the eutectoid. This tendency was indicated by the variation of the lattice parameter of the β-phase which, in the 4.0 wt.% Fe - 3.64 wt.% Cr alloy, changed from 3.250 kX after quenching, to 3.182 kX after 7 hours ageing at 400 °C. The results of the present investigation showed that the decomposition of the supersaturated solution in Ti-rich Ti-Fe-Cr alloys took place in the following manner:

$$\beta \rightarrow B + [\omega(\beta_{impov.}) + \beta_{enrich.}] \rightarrow \beta_{enrich.} + \omega \rightarrow \beta_{enrich.} + $$
$$+ \alpha \rightarrow \alpha + \text{chem. compound.}$$

Card 4/~~8~~ 4

33180
S/180/61/000/006/014/020
18.9200 E193/E383

AUTHORS: Ageyev, N.V., Karpinskiy, O.G. and Petrova, L.A.(Moscow)

TITLE: Stability of the beta-solid solution in titanium-iron-vanadium alloys

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 6, 1961, 127 - 129 + 1 plate

TEXT: The object of the present investigation was to study the effect of a third component (V or Fe) on the stability of the α-phase in binary Ti-Fe or Ti-V alloys. The composition of the experimental alloys is given in a table. The alloys, remelted several times in an argon-arc furnace, were hot-forged at 900 - 950 °C into rods measuring 9 x 9 x 100 mm. After machining-off the oxide skin, the rods were homogenized by a five-hour vacuum treatment at 900 °C, followed by furnace-cooling. The phase-transformations were studied by X-ray diffraction and hardness measurements. The results of examination of specimens quenched from 900 and 800 °C are given in Fig. 1, in the form of a metastable constitution diagram (the Ti, V and Fe contents

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33180

are given in wt.%), alloys situated above the broken or continuous lines represent those in which the β-phase can be retained on quenching from 800 or 900 °C, respectively; decomposition of the β-phase in alloys situated below these lines cannot be prevented by quenching and the alloys in this composition range consist of β- and ω-phases. In the next series of experiments the alloys 7, 8, 9 and 10 solution-treated at 900 °C, were aged at various temperatures for various times. Typical results are reproduced in Fig. 2, showing the constitution of the Ti-3.74 Fe - 14.68 V (graph a) and Ti - 3.87 Fe - 16.68 V (graph б) alloys as a function of ageing temperature (vertical axis, °C) and time (horizontal axis, min). The continuous curves divide each diagram into the β, β+ω and α+β regions; the numbers, ascribed to the experimental points, denote the Vickers hardness number of the alloy, while the broken lines form boundaries of the maximum-hardness regions. In general, it was found that with increasing alloying-additions content, the precipitation of the ω-phase in solution-treated

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Stability of the S/180/61/000/006/014/020
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Ti-Fe-V alloys aged at 400 °C was suppressed, the (β + ω) range became narrower, the quantity and particle-size of the ω-phase decreased and the hardness of the alloy was reduced to an extent which increased with increasing V content. It would appear that in alloys with 23 - 25% V and 3 - 4% Fe, aged at 400 °C, the (α + β) structure is formed directly from the β-solid solution without passing through the intermediate (β + ω) stage. The presence of additional (satellite) reflections on Laue photographs of specimens aged at 400 °C was taken to indicate the formation (in the initial stage of the process) of two-dimensional nuclei of the ω-phase surrounded by Ti-enriched β-solid solution. The size of these nuclei, calculated from the angular displacement of the satellite reflections, was ~ 220 Å . The satellite reflections disappeared on further ageing and the Laue photographs showed the lines of ω-phase and Ti-enriched β-solid solution only. It was concluded that decomposition of the β-solid solution in Ti-Fe-V alloys took place in the following manner:

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E193/E383

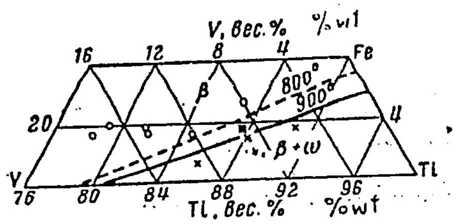
Stability of the ....

$\beta \to \beta + [\omega(\beta_{impov.}) + \beta_{enrich.}] \to \beta_{enrich.} + \omega \to \beta_{enrich.} +$
$+ \alpha \to \alpha$ + chemical compound.

There are 3 figures, 1 table and 4 Soviet-bloc references.

SUBMITTED: March 3, 1961

Fig. 1:



Card 4/4

88475

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S/078/61/006/001/018/019
B017/B054

AUTHORS: Ageyev, N. V., Karpinskiy, O. G., Petrova, L. A.

TITLE: Mechanism of Decomposition of Solid β-Solution of Titanium - Rhenium Alloys

PERIODICAL: Zhurnal neorganicheskoy khimii, 1961, Vol. 6, No. 1, pp. 251 - 252

TEXT: The authors studied the mechanism of decomposition of solid β-solution of titanium - rhenium alloys by metallographic and X-ray analyses, as well as by Vickers hardness measurements. The alloys were produced at the Laboratoriya redkikh i blagorodnykh metallov i splavov Instituta metallurgii Akademii nauk SSSR (Laboratory of Rare Metals, Precious Metals and Alloys of the Academy of Sciences USSR). A figure schematically shows hardness and structure of a titanium alloy with 19.91 % by weight of rhenium, which was hardened at 900°C. The solid β-solution of the titanium alloy with 19.91 % by weight of rhenium is decomposed on heating at 400°C with separation of the ω-phase; with extension in the reaction time, the ω-phase passes over into the α-phase. X

Card 1/2

88473

Mechanism of Decomposition of Solid β-Solution of Titanium - Rhenium Alloys

S/078/61/006/001/018/019
B017/B054

The mechanism of decomposition of solid β-solution of titanium - rhenium alloys proceeds according to the scheme $\beta \longrightarrow \beta + \omega \longrightarrow \beta + \alpha$. The increased hardness of β-alloys of titanium with rhenium is explained by a distortion of the crystal lattice of the solid β-solution. There are 1 figure and 5 Soviet references.

SUBMITTED: August 2, 1960

Card 2/2

18.1285

25518

S/078/61/006/008/018/018
B127/B226

AUTHORS: Ageyev, N. V., Karpinskiy, O. G., Petrova, L. A.

TITLE: Stability of the β-phase solution of a titanium-chromium alloy

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1976-1978

TEXT: This is to continue a series of studies on the β-phase Ti-Cr alloy, and to clarify the balancing of the metastable phase and the mechanism of dissociation at 100 - 400°C. Titanium and chromium iodides were used as initial materials which contained 1% of carbon and, as gaseous additions, 0.01% of oxygen and nitrogen, and 0.001% of hydrogen. The iron and silicon content did not exceed 0.05%. The components were fused in an arc furnace with tungsten electrodes and an argon atmosphere. The alloy was kept in molten state at 900 - 950°C with intermediate heating for 5 - 15 min. The melt was tempered in a muffle furnace at 900°C for 2 hr, and then gradually cooled in the furnace. Heat treatment of the samples was carried out in quartz ampuls evacuated to a pressure of 10^{-4} mm Hg. The samples were metallographically and roentgenographically examined; hardness was determined by the Vickers method and under a pressure of 10 kg.

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The β-phase can be obtained in metastable state in melts of 9% by weight (8.4 at%) of Cr by tempering at 800 and 900°C. All other alloys containing less than 9% of Cr showed β- and ω-phase structures. For this stabilization, different values are given in publications. They are explained by the impurity of the substances used and by the different rates of tempering of the alloys. In the present case, the stability of the β-phase of alloys having 9.14 and 9.79% by weight of Cr was studied at temperatures of 100 - 400°C. The stability of the β-phase is graphically shown in Fig. 2. The solid lines comprise the structural range; the dotted ones show the range of maximum hardness, the values of which are given in figures. The β-phase dissociates as follows: $\beta \longrightarrow \beta + [\omega(\beta_{\text{reduced}}) + \beta_{\text{concentrated}}] \longrightarrow \beta_{\text{concentrated}} + \omega \longrightarrow \beta_{\text{concentrated}} + \alpha \longrightarrow \alpha$ + chemical compound. There are 2 figures, 1 table, and 12 references: 10 Soviet-bloc and 2 non-Soviet-bloc. The two references to English-language publications read as follows: Ref. 7: F. B. Cuff, N. J. Grant, C. F. Floe. Trans Amer. Inst. min. (metall). Engrs, 194, 848 (1952); Ref. 8: D. J. Me Pherson, M. G. Fontana. Trans Amer. Soc. Metals, 43, 1098 (1951).

SUBMITTED: March 6, 1961

23830

18.1285 2808, 1045, 1454

S/020/61/138/002/019/024
B103/B220

AUTHORS: Ageyev, N. V., Corresponding Member AS USSR, and Petrova, L. A.

TITLE: General rules for the stabilizing of solid beta solution in titanium alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 2, 1961, 359-360

TEXT: The authors describe the factors influencing the minimum critical content of alloying addition needed for stabilizing the beta phase in titanium alloys. These factors have to be ascertained in order to establish the general rules of the above stabilization. Table 1 shows these minimum concentrations for 11 stabilizers by which a monophase structure of the solid beta solution in metastable state is obtained at room temperature. The sequence of these elements corresponds to their activity as stabilizers. Of these factors, the position of the element in the Periodic System is of particular importance. The authors state that the activity of the elements increases with their distance from titanium in the System. This dependence is due to the influence exerted

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by the dissolving component of the solid solution on the rearrangement of the lattice of the titanium solvent on quenching. This rearrangement is made difficult in the beta phase by introduction of a foreign atom, i.e. the more difficult, the greater is the chemical difference between the atoms of titanium and those of the other component of the solid solution and the stronger these atoms differ in size. The chemical nature of an atom as well as its size depend on the number of electrons in the atom, i.e. on the electron concentration. Thus, one is able to clarify the interdependence between the critical stabilizing concentration of the beta phase on quenching and the electron concentration. Table 1 shows this concentration, the number of electrons being considered to correspond to the group number of the relevant element. From this fact the authors conclude that the metastable beta phase can be obtained in titanium alloys at a practically equal number of electrons (averaging 4.2 per atom). These rules were checked by the authors for ternary alloys: Ti - Fe - V (Fig. 1), Ti - Fe - Cr, Ti - V - Mo, and Ti - Mo - Mn. If the electron concentration is known at which the beta phase is obtainable, one is able to calculate the compositions of the alloys which will give the structure of the solid beta solution on quenching. Fig. 1 shows the ternary

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metastable diagram of the phase composition in the system Ti - Fe - V. The straight line drawn in the corner of titanium, which separates the range of the beta phase from that of the $\beta+\omega$-phases has been obtained by connecting the points corresponding to the critical stabilizing concentrations of the alloying elements in the binary system Ti - Fe and Ti - V. Ternary alloys having an electron concentration below 4.2 are in the range of the $\beta+\omega$-phases. A titanium alloy with 3.11 atom% Fe and 5.37 atom% V (electron concentration 4.18 el/at (1)) has been proved to be such an alloy. The following alloys, however, have the structure of the beta phase: 4.35 atom% of Fe and 7.64 atom% of V (2), 2.61 atom% of Fe and 11.4 atom% of V (3) as well as that having 2.86 atom% of Fe and 14.18 atom% of V (4) whose electron concentration amounts to 4.24, 4.21, and 4.25 el/at, respectively. The above rule was also confirmed for further ternary alloys. There are 1 figure, 1 table, and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000100520002-1"

ROGACHEVSKAYA, Z.M.; AGEYEV, N.V., red.; MOSKVINA, R.Ya., red.;
SAMYLINA, S.I., tekhn. red.

[Constitutional diagrams of metal systems, published in 1960 (no.6)]Diagrammy sostoianiia metallicheskikh sistem, opublikovannye v 1960 godu (vypusk 6) [By] Z.M.Rogachevskaia. Pod red. N.V.Ageeva. Moskva, Proizvodstvenno-izdatel'skii kombinat VINITI, 1962. 173 p. (MIRA 16:2)
(Phase rule and equilibrium) (Metallography)

GOLUTVIN, Yuriy Mikhaylovich; AGEYEV, N.V., otv. red.; DRAGUNOV, E.S., red.; BAGRAMOVA, A.A., tekhn. red.

[Heats of formation and types of chemical bonds in inorganic crystals] Teploty obrazovaniia i tipy khimicheskoi sviazi v neorganicheskikh kristallakh. Moskva, Izd-vo Akad. nauk SSSR, 1962. 94 p. (MIRA 15:5)

1. Chlen-korrespondent Akademii nauk SSSR (for Ageyev).
(Crystals) (Heat of formation) (Chemical bonds)

VOL, Abram Yevgen'yevich; AGEYEV, N.V., red.; ABRIKOSOV, N.Kh., doktor khim.nauk, red.; KORNILOV, I.I., doktor khim.nauk, red.; SAVITSKIY, Ye.M., doktor khim.nauk, red.; OSIPOV, K.A., doktor tekhn.nauk, red.; GUSEVA, L.N., kand.khim.nauk, red.; MIRGALOVSKAYA, M.S., kand.khim.nauk, red.; SHKLOVSKAYA, I.Yu., red.; MURASHOVA, N.Ya., tekhn.red.

[Structure and properties of binary metallic systems] Stroenie i svoistva dvoinykh metallicheskikh sistem. Pod rukovodstvom N.V. Ageeva. Moskva, Fizmatgiz. Vol.2. [Systems of vanadium, bismuth, hydrogen, tungsten, gadolinium, gallium, hafnium, germanium, holmium, dysprosium, europium, iron] Sistemy vanadiia, vismuta, vodoroda, vol'frama, gadoliniia, galliia, gafniia, germaniia, gol'miia, disprozii, evropiia, zheleza. 1962. 982 p. (MIRA 15:5)

1. Chlen-korrespondent AN SSSR (for Ageyev).
(Alloys) (Systems (Chemistry)) (Phase rule and equilibrium)

S/598/62/000/007/002/040
D267/D307

AUTHORS: Ageyev, N. V. and Petrova, L. A.

TITLE: Stability of the ß-solid solution in titanium alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii, Titan i yego splavy. no. 7, Moscow, 1962. Metallokhimiya i novyye splavy, 26-34

TEXT: Earlier papers include metastable phase diagrams of titanium alloys with Fe, Mn, Ni, Mo, Cr, W. V and Nb, and data of the critical contents of alloying elements required to obtain a single-phase structure of ß-solid solutions. These phase diagrams belong to one of the main types: (1) Alloys quenched from the ß-phase region have the structure of metastable phases α', ω and ß; (2) in addition to these phases, also the α'' phase is present. Whereas the phases α' and α'' may exist in alloys either separately or in the presence of other phases, the ω phase always coexists with the α-phase, and is characterized by a high degree of dispersion. The critical content referred to above is the smaller, the farther the

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position (in the Periodic Table) of the alloying element is from that of Ti; in terms of electron concentration the critical content is always 4.2 electrons/atom. Thus in the system Ti-Fe-V an alloy with the electron concentration of 4.18 was in the region of $\beta + \omega$ phases, whereas alloys with electron concentrations 4.24, 4.21 and 4.25 had the β-phase structure. The survey includes also the results of research of the stability of metastable solid solution β and of the mechanism of its decomposition at various temperatures up to 500°C; up to the 'room' temperature this solid solution did not decompose (with only one exception). At higher temperature the stability is in general the higher, the greater the content of the alloying component. There are 11 figures and 1 table.

AGEYEV, N.V. (Moskva); KARPINSKIY, O.G. (Moskva); PETROVA, L.A. (Moskva)

Reply to IU.A.Bagariatskii's and G.I.Nosova's letter. Izv.AN SSSR. Otd.tekh.nauk. Met.i topl. no.4:188 Jl-Ag '62. (MIRA 15:8)

(Titanium alloys--Metallography) (Bagariatskii, IU.A.) (Nosova, G.I.)

AGEYEV, N.V.; GOLUTVIN, Yu.M.

M.V.Lomonosov and crystallochemistry. Vop.ist.est.i tekh. no.12:62-66 '62. (MIRA 15:4)
(Lomonosov, Mikhail Vasil'evich, 1711-1765)
(Crystallography)

36518

S/020/62/143/004/024/027
B101/B138

18.1275

AUTHORS: Ageyev, N. V., Corresponding Member AS USSR, and Shekhtman, V. Sh.

TITLE: Ordering of a solid solution on α-Mn base

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 4, 1962, 922-924

TEXT: The ordering of the single-phase alloy containing 20% by weight (6.9 at. %) rhenium and 80% manganese, which almost corresponds to the maximum solubility of Re in α-Mn, was investigated by Debye patterns. The following atom distributions were examined:

Distribution of the atoms

P	C	IA	S	I	II	III
2(a)	16	2.74	4Re+54Mn	4Re+6Mn	2Re	2Mn
8(c)	16	2.75			2Re+6Mn	4Re+4Mn
24(g)	13	2.64		24Mn	24Mn	24Mn
24(g')	12	2.57		24Mn	24Mn	24Mn

Legend: P = position; C = coordination number; IA = mean interatomic distance, Å; S = statistical distribution.

The calculation of structural amplitudes for $R_{Re} = 1.37$ and $R_{Mn} = 1.30$,

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based on equations available for the $I\bar{4}3m$ space group, showed that the ordering of the alloy could be evaluated by the intensities of the lines (321), (400), (411, 330), (332), (422), (431, 510). Samples produced in an HF furnace and annealed at 750, 800, and 950°C, were examined in the cast state, together with electrolytic Mn for a reference. Results: (1) The line intensity in the α-Mn Debye pattern agrees well with calculations for the case of disordered distribution. (2) The line intensities do not differ for cast and annealed samples. Heat treatment, therefore, does not modify the atom distribution. (3) Re atoms in the solid solution are partially in positions (a) and (c), without preferred occupation of either, i. e., there is a tendency toward ordered distribution corresponding to variant I. This is indicated by the intensifying of line (321) until it is almost as intense as (400), and by the approximately equal intensity of lines (422) and (431, 510), while line (332) fades slightly. (4) Only part of the Re atoms occupy positions corresponding to the maximum coordination number. About 2 Re atoms each settle in positions (a) and (c). The tendency of the larger Re atoms to occupy positions corresponding to the largest interatomic distances confirms the relationship between the formation of phases with α-Mn structure and the scale factor. There are 1 X

Ordering of a solid solution... S/020/62/143/004/024/027
B101/B138

figure and 2 tables.

SUBMITTED: November 29, 1961

X

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36912
S/020/62/143/005/010/018
B145/B138

18 12oo

AUTHORS: Ageyev, N. V. Corresponding Member AS USSR, and Shekhtman, V. Sh.

TITLE: A new compound in the system rhenium - iron

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 5, 1962, 1091-1093

TEXT: Re - Fe alloys with 40, 50 and 60% by weight of Re were investigated metallographically and by X-ray diffraction analysis. Carbonyl iron and carbonyl rhenium (99.9%) were used as starting materials. The samples were annealed at 750, 800, 950, and 1050°C and quenched from 1200 and 1300°C. Powder patterns were taken in CoK_{α} radiation without filter, in an PKД (RKD) camera. The patterns from specimens quenched from 1200 and 1300°C or annealed at 1050°C showed two systems of lines corresponding to the solid solution γFe - σ phase. At lower annealing temperatures, the σ phase lines disappeared, and, besides lines of the α (750 and 800°C)- and γ (950°C) solid solution, reflections of a new phase (γ' phase) appeared. According to the X-ray pattern the alloy with 60% Re is very close to the single-phase region of the new compound. The lines of the γ' phase fit in on the assumption of a cubic body-centered lattice. 8.960 kX was ob-

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tained for the a parameter of the unit cell (platinum standard). From this, z, the number of atoms per unit cell is calculated as 58.1, using density (12.92 g/cm^3). The X-ray pattern of the γ' phase is very similar to that of α-manganese ($z = 58$). Differences in intensity are due to the ordered distribution of Re and Fe in the γ' phase. Proceeding from the distribution 2(a): 2 Re, 8(c): 8 Re, 24(g): 8 Re, 16 Fe, 24(g'): 24 Fe, the line intensities of the γ' phase were calculated by means of the equation $I \sim Lp|F|^2$ ($L = 1 + \cos^2 2\theta / \sin^2 2\theta \cdot \cos\theta$, p = repetition factor, $|F|$ = modulus of the structure amplitude), and agreed well with the measurements. This means that the new compound has a structure of the α-manganese type with ordered distribution of the atoms in the unit cell. Compounds of the same structural type might exist in all systems with metals of the IVA, VA and VIA subgroup (except Cr and V). There are 1 figure and 2 tables.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy imeni A. A. Baykov)

SUBMITTED: November 29, 1961

S/020/62/146/002/007/013
B101/B144

AUTHORS: Ageyev, N. V., Corresponding Member AS USSR, Grankova, L. P., Novik, P. K.

TITLE: Effect of aluminum on the stability of the β-phase in titanium - molybdenum - iron alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 2, 1962, 351-354

TEXT: Titanium alloys containing 6.7-13.5% Mo, 2.2-10% Fe, and 1-3% Al were studied radiographically and metallographically and their hardness was determined in order to explain differences in the published data. Results: (1) All alloys except those containing 6.7% Mo, 2.2% Fe, and 1-3% Al form single-phase solid β-solutions when hardened at 700°C. Alloys containing 6.7% Mo, 2.2% Fe, and 1-2% Al form the β-phase after hardening at 900°C, those containing 3% Al form it after hardening at 1000°C. (2) In alloys containing 6.7% Mo, 2.2% Fe, 1-3% Al, the β-phase decomposed within 15 min at 200°C. Between 200 and 300°C, the ω-phase was formed and remained stable for 100 hrs. The hardness increased with the ageing temperature. At 400°C, a $\beta+\omega \longrightarrow \beta+\alpha$ transition took place in

L 13648-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pu-4 JD/JG/MLK

ACCESSION NR: AT4046210 S/0000/63/000/000/0005/0009

AUTHOR: Ageyev, N. V. (Moscow); Karpinskiy, O. G. (Moscow); Petrova, L. A. (Moscow)

TITLE: Stability of β-solid solution in titanium-niobium and titanium-tungsten alloys

SOURCE: Yubileynaya konferentsiya po fiziko-khimicheskomu analizu. Novosibirsk, 1960. Fiziko-khimicheskiy analiz (Physicochemical analysis); trudy konferentsii. Novosibirsk, Izd-vo Sib. otd. AN SSSR, 1963, 5-9

TOPIC TAGS: titanium base alloy, titanium niobium alloy, titanium tungsten alloy, beta titanium alloy, beta titanium stability, beta titanium stabilizer

ABSTRACT: The effect of niobium or tungsten on the stability of the β-phase and the mechanism of its decomposition in titanium-base alloys were studied. In titanium-niobium alloys with 36.8% Nb, a metastable β-phase can be preserved by quenching from 800C. In alloys with 34.6—36.5% Nb, quenched from the same temperature, the

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ACCESSION NR: AT4046210

β-phase was found to be partially decomposed. X-ray diffraction patterns of these alloys showed, in addition to the lines of β-phase, those of the α-phase, whose quantity increases with decrease in the niobium content and in the annealing temperature. It was found, however, that even in these alloys the β-phase can be preserved by an increase in the cooling rate. No ω-phase was found. In titanium-tungsten alloys with 26.64% W, the β-phase was preserved by quenching from 800C. Alloys with 16.[illegible]% W, [illegible] —1200C, have an α-phase structure, and alloys with [illegible], a [illegible] + ω-structure. In the alloy with 37.44 Nb, quenched from [illegible], the β-phase begins to decompose after 100 hr at 100C, 1 hr at [illegible]. The primary product of decomposition is ω-phase, which then changes to α-phase. In the alloys with 26.64% or 28.64% W, quenched from 900C, the β-phase begins to decompose after 1 hr at 300C. At 400C, the β-phase decomposes immediately, with precipitation of the ω-phase. Although it was not possible precisely to compare the stability of β-phase of Ti-W with that of Ti-Nb, there is some reason to assume that tungsten is a stronger stabilizer of the β-phase than niobium. Orig. art. has: 4 figures and 2 tables.

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L 13648-65
ACCESSION NR: AT4046210

ASSOCIATION: none

SUBMITTED: 10Sep63 ENCL: 00 SUB CODE: MM

NO REF SOV: 006 OTHER: 001 ATD PRESS: 3129

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AGEYEV, N. V., and MODEL, M. S.

"On the thermal expansion of chromium-base alloys"

Seminar on production methods, physical properties, and electron structure of refractory metals, compounds, and alloys, organized by the Institute of Powder Metallurgy and Special Alloys AS Ukr SSR, Kiev, 25-29 April 1963. (Teplofizika vysokikh temperatur, No. 1, 1963, p. 156)

S/226/63/000/002/012/014
A006/A101

AUTHORS: Ageyev, N. V., Tavadze, F. N., Kartvelishvili, [illegible]. M.

TITLE: Preparation of chromium chloride

PERIODICAL: Poroshkovaya metallurgiya, no. 2, 1963, 88 - 95

TEXT: A method of preparing chromium chloride is proposed which yields metal with a low content of gaseous and metallic impurities. The method consists in chlorinating ore, chrome oxide, or chrome metal with subsequent purification of the product by distillation in a chlorine current, and reduction with magnesium. Chlorination of Cr oxide was conducted at 950 - 1,000°C for 1 hour, and chlorination of electrolytic Cr at 595 - 605°C for 50 min. The reactor capacitor was coated with asbestos at the spot where Cr chlorides were deposited; this made it possible to maintain a temperature in the capacitor (500 - 600°C) exceeding the melting point of volatile chlorides but not attaining the melting point of Cr chloride. In such a manner only pure Cr chloride was deposited in the capacitor. The Cr-chlorides obtained were purified at 900 - 950°C by distillation in purified chlorine current. A spectral analysis of Cr chlorides

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S/226/63/000/002/012/014
A006/A101

Preparation of chromium chloride

obtained from Cr oxide and electrolytic Cr shows that high-purity chlorides can thus be obtained. The magnesium-thermal reduction of Cr chloride was performed in purified helium. Efficient reduction takes place at 650°C when magnesium is melted, and shows an explosive nature. The reactor was held at this temperature for 15 min; the temperature was then elevated to 850°C. Magnesium chloride and magnesium was eliminated from the crucible by melting and distillation in a vacuum during 80 min. Almost 100% Cr was extracted from the chloride in the form of gray powder containing not less than 99.96% Cr. The interaction between Cr chloride and magnesium during the reduction process was studied and is explained. There are 5 figures.

ASSOCIATION: Institut metallurgii AN GSSR i Institut metallurgii im. A. A. Baykov AN SSSR (Institute of Metallurgy, AS GSSR, and Institute of Metallurgy imeni A. A. Baykov, AS USSR)

SUBMITTED: April 14, 1962

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ACCESSION NR: AT4013921 S/2659/63/010/000/0015/0022

AUTHOR: Ageyev, N. V.; Model', M. S.

TITLE: Thermal expansion of chromium and solid solutions with a chromium base

SOURCE: AN SSSR. Institut metallurgii. Issledovaniya po zharoprochny*m splavam, v. 10, 1963, 15-22

TOPIC TAGS: chromium, chromium heat expansion, solid solution, chromium solid solution, isothermal curve, chromium solubility, thermal expansion, elasticity, elasticity modulus, roentgenography

ABSTRACT: One of the most important problems in the preparation of heat-resistant alloys is to increase the strength of the atomic interaction between the metal and the base. The present investigation used the roentgenographic method to measure the coefficients of thermal expansion of chromium (the metal with the best possibilities for heat-resistant materials) and of its solid solutions with molybdenum and vanadium. Figure 1 of the Enclosure shows the dependence of the modulus of elasticity on the content of molybdenum in solid solutions of Cr-Mo and the isothermic curve of the coefficients of thermal expansion of these alloys. The modulus of elasticity of the Cr-Mo alloys was measured by V. V. Kondrat'yev. In the region of the maximal increase of atomic interaction, the coefficient of thermal expansion is

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ACCESSION NR: AT4013921

lowered about 10%, while the modulus of elasticity increases 5%. In comparison with published data it is evident that for other transition elements such as iron and molybdenum, a strengthening effect of minute additions has been found when they are introduced into the solid solution. These values of the mechanical properties are close to those of chromium. On this basis it can be seen that a study of the strengthening action of minute additions is of interest. Orig. art. has: 2 formulas, 7 figures, and 2 tables.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy AN SSSR)

SUBMITTED: 00 DATE ACQ: 27Feb64 ENCL: 01

SUB CODE: ML NO REF SOV: 007 OTHER: 006

AGEYEV, N. V.

TITLE: Seminar on refractory metals, compounds, and alloys (Kiev, April 1963).

SOURCE: Atomnaya energiya, v. 15, no. 3, 1963, 266-267

ACCESSION NR: AP3008085

Ya. A. Kraftmakher. Heat capacity of W, Ta, and Nb.

V. M. Amonenko and others. Expansion coefficients of Zr, Nb, Mo, Ta, and W.

N. V. Ageyev, M. S. Model'. Expansion coefficients of chromium-base alloys.

S. N. L'vov, V. F. Nemchenko. Temperature dependence of emf and resistivity of Cr, Ti, V, and their borides, carbides, and nitrides; Ettingshausen-Nernst effect in titanium, TiB_2, TiC, and TiN.

N. V. Kolomoyets. The emf of chromium-group metals and their alloys.

G. V. Samsonov and others. Superconductivity and thermal-electron properties of refractory compounds.

D. A. Prokoshkin and others. Magnetic, optical, and other properties of refractory elements and the oxidation resistance of beryllides of refractory elements.

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AGEYEV, N.V.; MODEL', M.S.

Decay of solid solutions of niobium and titanium in chromium. Dokl. AN SSSR 148 no.1:84-87 Ja '63. (MIRA 16:2)

1. Institut metallurgii im. A.A. Baykova. 2. Chlen-korrespondent AN SSSR (for Ageyev).
(Chromium-niobium-titanium alloys) (Solutions, Solid)

AGEYEV, Nikolay Vladimirovich, nagrazhden ordenom Lenina, dvumya ordenami Trudovogo Krasnogo Znameni, medal'yu za doblestnyy trud v Velikoy Otechestvennoy voyne, otv. red.; KURDYUMOV, G.V., akademik, red.; ODING, I.A., red. [deceased]; PAVLOV, I.M., red.; ZUDIN, I.F., kand. tekhn. nauk, red.

[Study of steels and alloys] Issledovaniia stalei i splavov. Moskva, Nauka, 1964. 390 p. (MIRA 17:8)

1. Moscow. Institut metallurgii. 2. Chlen-korrespondent AN SSSR (for Odin, Ageyev, Pavlov).

KORNILOV, Ivan Ivanovich; AGEYEV, N.V., otv. red.; PRIKLONSKIY, A.A., red.

[Metallides and their interaction] Metallidy i vzaimodeistvie mezhdu nimi. Moskva, Nauka, 1964. 179 p. (MIRA 17:12)

1. Chlen-korrespondent AN SSSR (for Ageyev).

AGEYEV, N.V., otv. red.

[Achievements of science and technology: Metallurgy 1962] Itogi nauki i tekhniki: Metallurgiia 1962. Moskva, Akad. nauk SSSR, 1964. 347 p. (MIRA 18:12)

L 15658-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) ASD-3/AFFTC/ESD-3/IJP(c)/
ESD(gs)/ASD(a)-5/ASD(m)-3/AS(mp)-2 JD/JG/MLK

ACCESSION NR: AT4046809 S/0000/64/000/000/0005/0009

AUTHOR: Ageyev, N. V. (Corresponding member AN SSSR); Model', M. S.

TITLE: The thermal expansion of solid solutions based on chromium

SOURCE: AN SSSR. Nauchny*y sovet po probleme zharoprochny*kh splavov. Issledovaniya staley i splavov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 5-9

TOPIC TAGS: thermal expansion coefficient, solid solution, binary alloy, chromium based alloy, crystal lattice parameter, microhardness

ABSTRACT: The X-ray measurement results of the crystal lattice parameters and the coefficients of linear expansion of chromium alloys with Fe, W, Nb, and Ti are discussed in detail. The alloys were prepared by a twofold electrolysis, and the melting was done in a suspended state in a [illegible] helium atmosphere, with a gradual homogenization annealing at [illegible] under purified argon pressure. The resulting binary alloys were solid solutions with a homogeneous distribution of components. The dependence of the lattice parameter at room temperatures on the additive content of the binary solid solutions in various concentration regions, and the analogous dependence of the alloy microhardness, are shown. Ti and Nb showed the least solubility in chromium. Thermal expansion changes were also

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ACCESSION NR: AT4046809

studied for the alloys Cr-Mo, Cr-V, Cr-W and Cr-Fe, whose lattice parameters were measured at six temperatures (20-800C). The accuracy of the lattice parameter determination was 0.003%. Curves were drawn [illegible] which the average thermal expansion coefficients were calculated with an accuracy of 1-2%. The average thermal expansion coefficients for Cr-Fe alloys show that at admixture concentrations of 0.4-0.6 atoms %, there is a minimum on the curve. At greater contents of Fe, the coefficient is close to α for pure chromium and increases further. In Cr-V solid solutions, the thermal expansion minimum occurs with an admixture content of about 1 at.%. In Cr-W alloys, the minimum is reached at a W concentration of 0.3-0.4 at.%, while Cr-Mo alloys show a minimum at 0.4-0.6 at at.% Mo. A lowering of the thermal expansion in dilute solid solutions of chromium with Mo, W, V, and [illegible] deduced from the [illegible] the thermal expansion coefficient, indicating an increase [illegible] the crystal lattice energy of chromium [illegible] with small [illegible] with more concentrated solid solutions, the thermal expansion changes in accordance with the difference between the thermal expansion coefficients of chromium and the pure second component. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 16Jun64 ENCL: 00 SUB CODE: TD, MM

NO REF SOV: 005 OTHER: 011

Card 2/2

L 14320-65 EPF(n)-2/EWT(m)/EWP(b)/EWP(t) Pu-4 ASD(m)-3/AFTC(p)/IJP(c) JD/JG/MLK

ACCESSION NR: AT4048053 S/0000/64/000/000/0058/0073

AUTHOR: Ageyev, N. V.; Glazunov, S. G.; Petrova, L. A.; Tarasenko, G. N.; Grankova, ~~L. P.~~

TITLE: Stability of Beta alloys of the Ti-Mo-Cr-Fe-Al system

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 58-73

TOPIC TAGS: alloy structure, Beta alloy, alloy phase transformation, titanium alloy, molybdenum alloy, chromium alloy, iron alloy, aluminum alloy

ABSTRACT: Previous studies have shown the critical concentration for the β-solid solution of another element in titanium to be between 6 and 9%, and that the most stable of these combinations are formed by rhenium, nickel, molybdenum, and tungsten. Recently, there has been much interest in multicomponent alloys with the metastable β-structure, which have high technological versatility when hardened. For these and other reasons the authors decided to study the Ti-Mo-Fe-Cr-Al system, both in its β-phase and with an eye to choosing alloys for more detailed experimentation. The samples chosen for experimentation had molybdenum in concentrations of wt. 2-8%, chromium from 4-9%, iron from 3-8%, titanium from 81-83%,

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ACCESSION NR: AT4048053

and aluminum constant at 3%. All samples but one were held at 200C for 100 hours, and that one was held at 200C for 9 hours. Two samples were also held at 300C for 100 hours; all the remaining samples disintegrated. Four of them disintegrated with the precipitation of the ω-phase, which lasted 100 hours longer; the others disintegrated with the precipitation of the α-phase. Samples which had 2 and 5% Mo did not depend, for the stability of their properties, on the corresponding amounts of chromium and iron within the limits studied. The samples with 2% Mo had amounts of chromium decreasing from 9.07 to 3.76% while the iron increased from 2.8 to 7.3%; the amount of chromium in samples with 5% Mo decreased from 9.40 to 4.08% while the amount of iron increased from 3.04 to 5%. In samples containing up to 5% each of iron and chromium, 1 or 2% more than 5% Mo did not significantly increase the stability of the β-alloy, and the delay in the process of disintegration is hardly worth the cost. Orig. art. has: 2 tables, 23 graphs, 11 photomicrographs, and 4 roentgenograms.

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 005 OTHER: 000

Card 2/2

ACCESSION NR: AP4041145 S/0020/64/156/004/0789/0791

AUTHOR: Ageyev, N. V.; Glazunov, S. G.; Petrova, L. A.; Tarasenko, G. N.; Grankova, L. P.

TITLE: Dislocations in the titanium - molybdenum - iron - aluminum alloys

SOURCE: AN SSSR. Doklady*, v. 156, no. 4, 1964, 789-791, and insert facing p. 790

TOPIC TAGS: alloy dislocation, Ti Mo Fe Al, alloy, chilled alloy microstructure, etching, electromicroscopic study

ABSTRACT: By analyzing the structure of a quenched β - alloy of Ti - Mo - Fe - Al, the authors have found precipitations having the appearance of "sticks". Similar "sticks" were found earlier in quickly chilled Ti - 10% Mo alloys by T. H. Schofield et al. (Acta Metallurgica 7, no. 6, 403, 1959) who described them as regular arrays of etch holes caused by unstable groups of dislocations which are changed during cooling into a stabler net of subgrains. X-ray diffraction patterns obtained by the present authors show no presence of a new phase such as titanium hydride. It is pointed out that dislocations which are present in all metals, become apparent only under favorable conditions of etching. Electromicroscopic study of the "sticks" has actually demonstrated that they are formed by a series of little

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ACCESSION NR: AP4041145

holes. Orig. art. has: 4 figures.

ASSOCIATION: Institut metallurgii im A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 05Feb64 ENCL: 00

SUB CODE: MM NO REF SOV: 005 OTHER: 002

Card2/2

L 57509-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t)/EWP(b)/EWA(c)
IJP(c) JD/JG

ACCESSION NR: AP5013155 UR/0129/65/000/005/0033/0035
669.295'71'26'28:621.785.74

44
B

AUTHOR: Ageyev, N. V.; Glazunov, S. G.; Petrova, L. A.; Tarasenko, G. N.; Grankova, L. P.

TITLE: Aging of β-alloys in the Ti-Mo-Cr-Fe-Al system

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1965, 33-35, and insert facing p. 24

TOPIC TAGS: titanium alloy, chromium alloy, molybdenum alloy, aluminum alloy, metal physical property, metal hardness, metal aging

ABSTRACT: An attempt was made to find an aging treatment which gives maximum hard-
ness and strength. A series of β-alloys were selected for studying structure and
hardness as a function of aging temperature from [illegible]. The Ti alloys in-
vestigated varied in composition: Mo (1.6-7.9%), Cr (3.4-7.7%), Fe (3.1-6.1%) and
Al (3.2-3.6%). After due processing and heat treatment, the alloys were examined
[illegible] and Vickers hardnesses were measured. Both metallographic and [illegible] given in

by x-ray analysis, and Vickers hardness ... x-ray techniques showed β-solid solutions. All of the hardness data are given in

Card 1/4

L 57509-65

ACCESSION NR: AP5013155

fig. 1 of the Enclosure. The alloys were aged, after prior annealing and treatment, for one hour at temperatures ranging from 300 to 1000°C. The hardness shows a maximum around 500-550°C depending on the alloy. From 600-800°C the hardness gradually diminishes, and after 800°C an insignificant increase is noted in some alloys. All of the alloys have β-solid solution structures when aged at 300 and 400°C. A mixture of α + β is noted after aging above 450°C, paralleling the increase in hardness. The maximum in hardness coincides with the greatest quantity of α-phase, and upon further aging the quantity of α-phase diminishes as does the hardness. At 800°C, all alloys revert to a β-solid solution.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 02 SUB CODE: MM, AS

NO REF SOV: 001 OTHER: 000

Card 2/4

EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG

ACC NR: AP5026360 SOURCE CODE: UR/0370/65/000/005/0134/0138

44 55 44 55

AUTHOR: Ageyev, N. V. (Moscow); Novik, P. K. (Moscow)

ORG: none

TITLE: Effect of aluminum on the stability of the β-phase in Ti-Mo-Mn alloys

44,55,27

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 134-138

TOPIC TAGS: alloy, titanium base alloy, molybdenum alloy, manganese alloy, aluminum containing alloy, nonferrous metal alloy, metal test, alloy composition, alloy phase diagram

ABSTRACT: The study examined the effect of aluminum on the stability of the β-phase in Ti-Mo-Mn alloys. Prior to testing for stability of the β-phase, the alloy samples were forge worked at 1223-1023°K to thin plates, vacuum soaked for 2 hours at 1173°K and cooled. Aging tests were carried out at 573, 673, 773, and 873°K. Test duration varied from 15 minutes to 100 hours. The Mn + Mo contents in the alloys were 20-24%, 16%, and 12-13%. The study encompassed the following alloys: Ti-10Mn-12Mo-1Al, Ti-10Mn-12Mo-2Al, Ti-10Mn-3Al, Ti-7Mn-9Mo-1Al, Ti-7Mn-9Mo-2Al, Ti-7Mn-9Mo-3Al, Ti-3.2Mn-9.5Mo-1Al, Ti-3.2Mn-9.5Mo-2Al, and Ti-3.2Mn-9.5Mo-3Al. In Ti-Mo-Mn alloys, the stability of the β-phase increased sharply in proportion to increases in the Al content (from 1 to 3%). For alloys containing 16% of Mo + Mn, the introduction of 1% Al suppressed the formation of the metastable ω-phase. In the case of alloys containing

Card 1/2 UDC: 669.295.5'28'74'71.017.3

ACC NR: AP5026360

12-13% of Mo + Mn, the introduction of 1 or 2% Al caused a sharp reduction in the ω-phase concentration at 673°K, and the introduction of 3% Al eliminated the formation of the ω-phase at 673°K. It was found that the presence of Al in Ti-Mo-Mn alloys inhibited the diffusion processes in alloys and the decay of the β-phase, increased the length of the induction period, and prevented crystallization in the ω-phase. It was recommended that the development of commercial alloy reinforcing by means of stabilization of the β-phase center on Ti-Mo-Mn alloys containing approximately 18% (Mo + Mn) and 3% Al. Orig. art. has: 2 figures, 2 tables.

SUB CODE: 11/ SUBM DATE: 14May64/ ORIG REF: 002/ OTH REF: 001

Card 2/2

L 55852-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EPF(n)-2/EWP(b) IJP(c) JD/JG

ACCESSION NR: AP5013117

UR/0370/65/000/002/0141/0146
669.295
35
B

AUTHOR: Ageyev, N. V. (Moscow); Glazunov, S. G. (Moscow); Petrova, L. A. (Moscow); Tarasenko, G. N. (Moscow); Grankova, L. P. (Moscow)

TITLE: Hot hardness in β alloys of the Ti-Mo-Cr-Fe-Al system

SOURCE: AN SSSR. Izvestiya. Metally, no. 2, 1965, 141-146

TOPIC TAGS: titanium alloy, molybdenum alloy, chromium alloy, aluminum alloy, iron alloy, metal mechanical property

ABSTRACT: Hot hardness measurements on six Ti-Mo-Cr-Fe-Al alloys gave a preliminary idea of the over-all high temperature strength properties. Measurements were in the 20-1000°C range (after holding for one minute) and hardness versus time plots (1, 5, 15, 30 minutes) were also obtained at [illegible], and 800°C under a load of 1 Kg. Differences in positions of maximum hardness for the forged at 1000°C but not reheated to 700°C specimens is said to be caused by the different amounts of α segregations. Alloy compositions used had somewhat varying compositions. Non heat-treated (forged) alloys maintained a higher hot hardness than heat treated al-

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L 55852-65

ACCESSION NR: AP5013117

loys, i.e. hardness at 600°C was about the same as room temperature. A sharp drop is noticed after 700°C. The 700°C reheat does not provide enough time for the attainment of equilibrium conditions. A truer picture of β precipitation would be attained with longer annealing time under vacuum. Hardness versus time curves sometimes show slight rises with increasing time due to precipitation of β. High temperature hardness in the 20-600°C range indicated effectual high temperature strengthening. Orig. art. has: 2 figures, 1 table.

ASSOCIATION: none

SUBMITTED: 24Feb64 ENCL: 00 SUB CODE: MM

NO REF SOV: 005 OTHER: 000

Card 2/2

AGEYEV, N.V.; GLAZUNOV, S.G.; PETROVA, L.A.; TARASENKO, G.N.; GRANKOVA, L.P.

Aging of β-alloys of the system Ti - Mo - Cr - Fe - Al. Metalloved. i term. obr. met. no.5:33-35 My '65. (MIRA 18:7)

AGEYEV, N.V.

Nature of metallic phases. Izv.AN SSSR.Neorg.mat. 1 no.10:1629-1634 O '65. (MIRA 18:12)

1. Institut metallurgii imeni A.A.Baykova, Moskva. Submitted July 5, 1965.

ACC NR: AP6036757 (A) SOURCE CODE: UR/0020/66/171/001/0077/0080

AUTHOR: Ageyev, N. V. (Corresponding member AN SSSR); Ivanova, V. S.; Petrova, L. A.; Kudryashov, V. G.; Grankova, L. P.

ORG: Institute of Metallurgy im. A. A. Baykov, AN SSSR (Institut metallurgii Akademii Nauk SSSR)

TITLE: Effect of structure on the resistance of β-titanium alloy crack propagation 27 18

SOURCE: AN SSSR. Doklady, v. 171, no. 1, 1966, 77-80

TOPIC TAGS: titanium, molybdenum alloy, chromium containing alloy, iron containing alloy, aluminum containing alloy, ~~alloy~~ heat treatment, ~~alloy structure, alloy mechanical property~~/IVT-1 alloy

ABSTRACT: Specimens of IVT-1 β-titanium alloy of optimum composition (7% Mo, 5.5% Cr, 3% Fe, and 3% Al) were solution heat treated at 800C (the β-region), wat quenched, and aged at 450C for 50 hr, at 500C for 20 hr, at 525C for 15 hr, or 500C for 15 hr. Microscopic examination showed that decomposition of the β-s solution became more uniform as the aging temperature increased. After agi 525C for 15 hr, the alloy structure consisted of the β-solid solution mat uniformly reinforced with α-phase acicular fibers 2 μ or more long with about one order lower. Similar precipitated α-phase fibers within β-gra their boundaries were also observed in the alloy aged at 550C for 15 hr.

Card 1/2 UDC: 669.295.5:620.17

SOURCE CODE: UR/0000/65/000/000/0089/0091

ACC NR: AT6012374

AUTHORS: Ageyev, N. V.; Glazunov, S. G.; Petrova, L. A.; Tarasenko, G. N.; Grankova, L. P.

ORG: none

+3
B+1

TITLE: Investigation of alloys of the system Ti--Mo--Cr--Fe--Al

27 27 27 27 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 89-91

TOPIC TAGS: titanium, iron, chromium, molybdenum, aluminum, titanium alloy, metal aging, annealing, hardness, x ray spectrum

18

ABSTRACT: The effect of annealing 18 and aging on the hardness and x-ray spectra of alloys derived from the system Ti--Mo--Cr--Fe--Al was studied. The experimental procedure was described earlier by N. V. Ageyev and L. A. Petrova (Dokl. AN SSSR, 1961, 138, No. 2, 359). Five different alloy com- [illegible] were studied, and the experimental results are presented graphically [illegible] 1). Photographs of polished sections of the alloys annealed at different temp[illegible]es and aged for different periods of time are presented. The presence of satellite lines in the x-ray spectrograms are noted, but the authors refrain from giving an explanation for their presence. It is concluded that the alloys may prove interesting as low-alloy β-stabilizing high-strength titanium alloys.

Card 1/2

L 27511-66

ACC NR: AT6012374

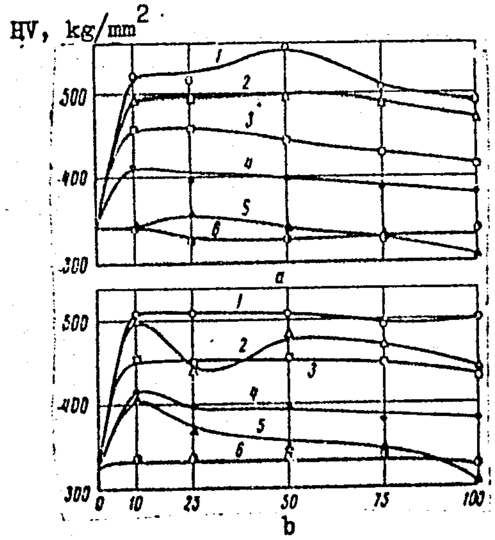

Fig. 1. Hardness of alloys as a function of the temperature and duration of aging. Aging temperature in C: 1 - 350; 2 - 400; 3 - 450; 4 - 500; 5 - 550; 6 - 600. (a) alloy 1T (2.9% Fe; 5.35 Cr; 1.47 Mo, 2.53 Al; 0.020 C; and 0.025 N); (b) alloy 5T (3.01% Fe; 7.7 Cr; 0.7 Mo; 1.2 Al; 0.016 C; and 0.021 N).

Orig. art. has: 1 table and 5 figures.

Card 2/2 BLG SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 004

L 29192-66 EWT(m)/EWP(w)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/HW/JG

ACC NR: AP6016583 (A) SOURCE CODE: UR/0129/65/000/005/0012/0014

AUTHOR: Ageyev, N. V.; Glazunov, S. G.; Petrova, L. A.; Tarasenko, G. N.; Grankova, L. P.; Shelest, A. Ye.

46 44 B

ORG: none

TITLE: High-temperature thermomechanical treatment of β-alloy of the Ti-Mo-Cr-Fe-Al system

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1966, 12-14

TOPIC TAGS: thermomechanical treatment, titanium alloy, titanium beta alloy, molybdenum containing alloy, iron containing alloy, aluminum containing alloy, alloy thermomechanical treatment, alloy mechanical property, alloy structure

ABSTRACT: Forged specimens of complex titanium-base alloy containing 7%Mo, 5.5%Cr, 3%Fe, and 3%Al were subjected to high-temperature thermomechanical treatment (HTMT), rolled at 850, 950, and 1050C with a 20, 40, and 60% reduction in one pass and 80% in two passes, immediately water quenched, and then aged at 450C for 15 and 25 hr, at 500C for 5 and 10 hr, or at 525C for 5 hr. HTMT increased alloy strength without affecting ductility. For example, prior to aging the tensile strength of alloy hot rolled at 950C with a reduction of 20, 40, 60, and 80% was 96.5, 105.0, 96.7, and 99.5 kg/mm^2, respectively, compared with 77.3 kg/mm^2 for alloy quenched from the same temperature without deformation. The corresponding figures for elongation were

 UDC: 295:621.771:621.735.61'74

L 29192-66

ACC NR: AP6016583

2

16.6, 18.4, 17.7, and 18%, respectively, compared with 16.9%. The increased strength of the alloy after HTMT is explained by strain hardening and fragmentation of the β-alloy grains. Aging produced a further significant increase of strength. The best combination of strength and ductility was obtained after HTMT with 60—80% reduction at 850C and aging at 500C for 10 hr or 525C for 5 hr, after which the alloy had a tensile strength of 164—177 kg/mm^2, an elongation of 4.5—9.0%, and a reduction of area of 8—15%. This effect of aging was found to result from the precipitation of the finely dispersed α-phase. Orig. art. has: 3 figures and 1 table. [MS]

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 008/ ATD PRESS: 5004

Cord 2/2 BLG

L 44354-66 EWT(m)/EWP(t)/ETI/EWP(k)

ACC NR: AP6019834 (N) SOURCE CODE: UR/0370/66/000/001/0139/0148

AUTHOR: Ageyev, N. V. (Moscow); Glazunov, S. G. (Moscow); Petrova, L. A. (Moscow); Tarasenko, G. N. (Moscow); Grankova, L. P. (Moscow)

63
62
B

ORG: none

TITLE: Investigation of metastable β-alloys of the Ti-Mo-Fe-Al system

SOURCE: AN SSSR. Izvestiya. Metally, no. 1, 1966, 139-148

TOPIC TAGS: phase analysis, quaternary alloy, titanium base alloy, molybdenum, iron, aluminum, metal aging, mechanical property

ABSTRACT: This is a continuation of previous investigations (Ageyev, N. V., Rogachevskaya, Z. M. Zh. neorgan. khimii, 1959, IV, vyp. 10, 2323-2328; Ageyev, N. V., Grankova, L. P., Novik, P. K. Dokl. AN SSSR, 1962, 146, no. 2, 351-354) with the difference that it deals with Ti-Mo-Fe-Al alloys which quench to the β-solid solution, i.e. have an electron concentration of more than 4.20 el/at, but contain not more than 8.5% Fe and 8% Mo as well as 2.3 and 4% Al, and hence are of greater practical interest. Ingots of these alloys were melted by using a mixture of titanium sponge, Al-Mo master alloy, pure Al and armco iron. The ingots,

UDC: 669.295

L 44354-66

ACC NR: AP6019834

18

weighing 400 g, were lathe-turned and subsequently hot-forged in an electric furnace at 1000-1100°C into rods of 15 mm diameter and squares measuring 15x15 mm. The forged alloys were annealed at 750 and 800°C for 1 hr and water-quenched. All the alloys quenched from 750°C had the $\beta + \alpha$ phase structures, and all those quenched from 800°C, the structure of the β-solid solution, as was to be expected from their electron concentration. The forgings were milled in a milling machine and cut up into specimens for microstructural and radiographic examination as well as for tests of hardness and tensile strength. Measurements of the Vickers hardness of these alloys as a function of aging temperature (200-600°C) and time (1-100 hr) revealed that for most of the alloys hardness reaches its maximum (~500 kg/mm) after 10-25 hr at any aging temperature within the limits considered and thereafter remains virtually constant for 100 hr. β-alloys containing 2% Al, when heated to 400-500°C, undergo decomposition with segregation of ω-phase which gets transformed into α-phase after 10 hr. β-alloys containing 3 and 4% Al undergo decomposition with segregation of α-phase. Of the alloys of Ti + 7% Mo + 6% Fe + 2, 3 and 4% Al the best mechanical properties (tensile strength 160 kg/mm^2, plasticity 7.0%) were displayed by the alloy with 3% Al aged at 525°C for 20 hr and subsequently cooled in air. Orig. art. has: 7 figures, 3 tables.

SUB CODE: 11, [illegible] 13/ SUBM DATE: 02Mar65/ ORIG REF: 005/

Card 2/2 blg

SOURCE CODE: UR/0000/66/000/000/...

ACC NR: AT6034440 (A)

AUTHOR: Ageyev, N. V.; Model', M. S.

ORG: none

TITLE: The effect of small additions and impurities on the lattice constant and thermal expansion of molybdenum

SOURCE: AN SSSR. Institut metallurgii. Svoystva i primeneniye zharoprochnykh splavov (Properties and application of heat resistant alloys). Moscow, Izd-vo Nauka, 1966, 93-98

TOPIC TAGS: molybdenum, crystal lattice, thermal expansion

ABSTRACT: The article reports measurement of the lattice constant of metalloceramic molybdenum and an evaluation of its change with different degrees of refining. The samples were prepared by arc melting in a vacuum, by melting in a suspended state, by zone refining, and by electron beam melting. The lattice constants were measured by reverse exposure with flat, massive, and powder samples. Spectrally pure gold was used as the standard. A table, based on the experimental results, gives the values of the lattice constants for molybdenum of different purities. It was found that annealing at 1200°C completely eliminates the stresses. The depth of the hardened layer depends on the method of working the surface; in the given case, it was of the

Card 1/2

ACC NR: AP7002403 SOURCE CODE: UR/0363/66/002/012/2156/2161

AUTHOR: Alekseyevskiy, N. Ye.; Ageyev, N. V.; Shamray, V. F.

ORG: Institute of Metallurgy im. A. A. Baykov Academy of Sciences SSSR (Institut metallurgii Akademii Nauk SSSR)

TITLE: The critical temperature of the transition to the superconducting state of the β-phase in the Nb-Sn-Al-Ge system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 12, 1966, 2156-2161

TOPIC TAGS: niobium, tin alloy, aluminum containing alloy, germanium containing alloy, superconducting alloy, ~~superconduction transition temperature~~, ~~alloy transition~~ temperature, phase transition

ABSTRACT: Beta-alloys of the Nb-Sn-Al-Ge system with various contents of the alloying elements were levitation melted from 99.8%-pure niobium and 99.999%-pure aluminum, tin and germanium, homogenized at 600C for 250 hr and water quenched. Nb_3Sn, Nb_3Al and Nb_3Ge compounds were found to have a temperature of transition to the superconducting state (T_{cr}) of 18.1, 17.4 and 7.1K, respectively. With increasing Sn content in alloys of the pseudobinary Nb_3Sn-Nb_3Al section, T_{cr} gradually decreased, reached a minimum at the Sn:Al ratio of 1:1, and gradually increased again with a further increase in the Sn content. In alloys of the Nb_3Sn-Nb_3Ge section, T_{cr} dropped sharply with

UDC: 546.3—19—882—811—621—289

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ACC NR: AP7002403

an increase of Nb_3Ge content to about 70%, and then remained almost constant. With small increases in the Ge content of alloys along the Nb_3Al-Nb_3Ge section, T_{cr} slightly increased to a maximum in an alloy with a 4:1 Al:Ge ratio, and then decreased continuously with increasing Ge content. The

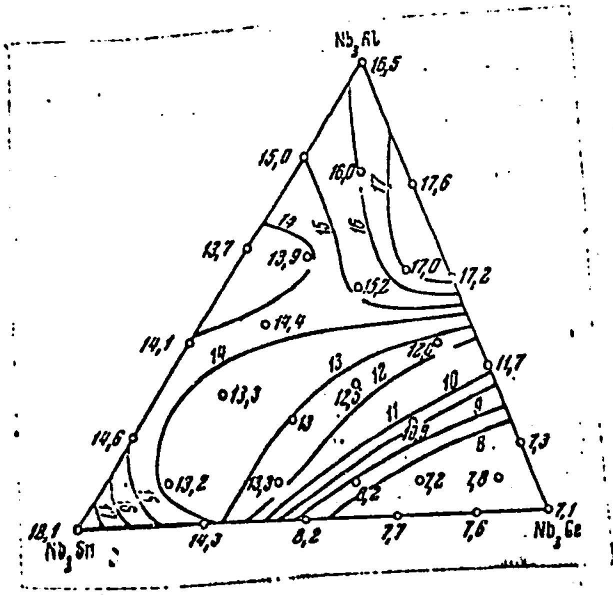

Fig. 1. Critical temperatures (K°) of alloys of the Nb_3Sn-Nb_3Al-Nb_3Ge section

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ACC NR: AP7002403

composition dependence of T_{cr} in the $Nb_3Sn-Nb_3Al-Nb_3Ge$ section is shown in Fig. 1. The critical temperature T_{cr} was also found to increase with the increasing degree of ordering of the investigated alloys. In the Nb-Sn-Al-Ge system, the value of T_{cr} appears to be determined mainly by the density of states at the Fermi surface. Orig. art. has: 7 figures.

SUB CODE: 11, 20/ SUBM DATE: 09Mar66/ ORIG REF: 007/ OTH REF: 008/
ATD PRESS: 5113

ZAGRUDNYI, Ivan Vasil'yevich, inzh.-mekhanik; AGEYEV, P.M., red.; GONCHAROVA, Ye.A., tekhn. red.

[How to obtain high productivity from earthmoving machinery] Kak proizvoditel'no ispol'zovat' zemleroinye mashiny. Belgorod, Belgorodskoe knizhnoe izd-vo, 1961. 42 p. (MIRA 15:2)

(Earthmoving machinery)

KOTEL'NIKOV, Boris Pavlovich; BOLYANOVSKIY, Dmitriy Mikhaylovich; AGEYEV, P.M., red.; GONCHAROVA, Ye.A., tekhn. red.

[First in the country; story of the Shebekino Combine of Synthetic Fatty Acids and Aliphatic Alcohols]Pervyi v strane; rasskaz o Shebekinskom kombinate sinteticheskikh zhirnykh kislot i zhirnykh spirtov. Belgorod, Belgorodskoe knizhnoe izd-vo, 1961. 49 p. (MIRA 15:8)

1. Direktor Shebekinskogo nauchno-issledovatel'skogo instituta sinteticheskikh zhirozameniteley i moyushchikh sredstv (for Kotel'nikov). 2. Glavnyy inzhener kombinata sinteticheskikh zhirnykh kislot i zhirnykh spirtov (for Bolyanovskiy).
(Shebekino—Oils and fats)

AGEEYEV, P. Ya.

CA

11

Distribution of nitrogen in the steel bath of an electric furnace. P. Ya. Ageev. *Metallurg* 11, No. 7, 66-71 ([illegible]).—The N content of the steel decreases as the distance from the electrodes increases. The N content is greatest at the beginning of the heat and decreases steadily until the slag is skimmed, after which it increases.

H. W. Rathmann

METALLURGICAL LITERATURE CLASSIFICATION

AGEYEV, P. Ya.

Ca

4

Use of low pressures in the production of steel. P. Ya. Ageyev, S. V. Drichek and I. S. Rozengauz. *Metallurg* 11, No. 11, 33-7(1936).--Steel contg. C 0.19-0.43% and O 0.014-0.026% was melted in an induction furnace under a pressure of 20-35 mm. Hg. Owing to reaction with C the O content was reduced to 0.006-0.012%. Some of the C reduced part of the MgO of the crucible. H. W. R.

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

AGAYEV, P. YA.

AGEYEV, P. Ya.

7

On the Kinetics of the Reactions in the Production of Steel. P. Ya. Ageev. (Metallurg, 1940, No. 2, pp. 3–15). (In Russian). The author points out that Schenck's formula for the rate of oxidation of carbon according to the equation $FeO + C \rightleftarrows CO + Fe$ in open-hearth and electric furnaces is not in accordance with the true state of affairs and does not explain some results actually observed. It is suggested that the methods of chemical dynamics (the exponential rate of reaction involving the idea of reaction only between activated molecules) should be applied to reactions occurring in the steel-melting process. It is shown how the equations derived will explain such observed facts as the differences in the rates of carbon removal from melts with originally equal carbon and oxygen contents and the consistently slightly higher nitrogen content of electric-furnace as compared with open-hearth steel. The mechanism of the activation of molecules is considered. Since the activation of molecules leads to more rapid reaction and the more rapid completion of the processes involved in the production of steel, it would appear that the electric-arc furnace with its enhanced activating conditions is to be favoured. Attempts to slow down rates of reaction in arc furnaces to the level of those in open-hearth furnaces are misguided.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

AGEYEV, P.Ya.

CA

9

Role of surface phenomena in the development of processes in steel production. P. Ya. Ageev. *Nauchno-Tekhnicheskaya Konferentsiya Leningrad Politekh. Inst., 3rd Conf.*, 1944, 60-70. The phase rule is discussed in connection with manganese steel process. The observed facts in practice support the idea of formation of stable compounds: $(FeO)_2SiO_2$, $FeO.SiO_2$, and $MnO.SiO_2$. Interface influence is briefly discussed. G. M. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

USSR/Metals — Jun 1947
Steel, Liquid

"Physical and Chemical Processes in Liquid Steel," P. Ya. Ageyev, Candidate Tech Sci, Leningrad Polytech Inst, 5 pp

"Stal'" No 6

Investigation of physical and chemical processes which occur in liquid metal, particularly those concerned with generation of nonmetallic additions, permits an examination of formation of properties of steel; especially first step, which depends on content of additions. To solve these problems, it is necessary to broaden studies of surface tension on

[redacted] 58T79

USSR/Metals (Contd) — Jun 1947

liquid metal--a product of chemical reaction, and to work out a method for evaluating this important factor in metallurgical processes.

[redacted] 58T79

AGEYEV. P. Ia.

Ageyev. P. Ya. - "Determining the diffusion coefficient of ferrous oxide in slag." Sbornik nauch.-tekhn. o-vo metallurgov, Leningr. otd-niye), Issue 1, 1949, p. 22-31, - Bibliog: 7 items

SO: U-5240, 17, Dec. 53,(Letopis 'Zhurnal 'nykh Statey, No. 25, 1949).

AGEYEV, P.Ya.; ALABYSHEV, A.F.; BAYMAKOV, Yu.V.; BELYAYEV, A.I.; BATASHEV, [illegible];
BUGAREV, L.A.; VASIL'YEV, Z.V.; GUPALO, I.P.; GUS'KOV, V.M.; ZHURIN, A.I.;
VETYUKOV, M.M.; KOSTYUKOV, A.A.; LOZHKIN, L.N.; OL'KHOV, N.P.;
OSIPOVA, T.V.; PERTSEV, I.I.; RUMYANTSEV, M.V.; STRELETS, Ye.L.;
FIRSANOVA, L.A.; CHUPRAKOV, V.Ya.

Georgii Alekseevich Abramov. TSvet.met. 27 no.2:72-73 Mr-Ap '54. (MIRA 10:10)
(Abramov, Georgii Alekseevich, 1906-1953)

137-1958-2-2355

Ageyev, P. Ya.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 22 (USSR)

AUTHORS: Suchil'nikov, S.I., Ageyev, P.Ya.

TITLE: Investigation of the Thermionic Properties of Steel-smelting Sl... (Issledovaniye termoelektronnykh svoystv staleplavil'nykh s...ov)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 453-463. Diskus. pp 505-512

ABSTRACT: Methods are described for measuring the emission current at temperatures of appx. 1600°. A study was made of slags containing CaO and SiO_2, CaO, SiO_2 and Al_2O_3 and of four slags from electric reducing furnaces. It was found that the work-function potential depended on the CaO:SiO_2 ratio. It was noted that, as the SiO_2 concentration in the slag increased, the emissivity of the slag decreased, whereas the work-function potential increased. Yu.N.

1. Slags--Electrical properties

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AGEYEV, P.Ya.

DUBROV, N.F., kand. tekhn. nauk; MIKHAYLOV, O.A., kand. tekhn. nauk; FEL'DMAN, I.A.; DANILOV, A.M.; SOROKIN, P.Ya., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; BUTAKOV, D.K., kand. tekhn. nauk, dots.; SOYFER, V.M.; LATASH, Yu.V., mladshiy nauchnyy sotrudnik; ZAMOTAYEV, S.P.; BEYTEL'MAN, A. I.; SAPKO, A.I.; PETUKHOV, G.K., kand. tekhn. nauk; YEDNERAL, F.P., kand. tekhn. nauk, dots.; LAPOTYSHKIN, N.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; ROZIN, R.M.; NOVIK, L.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; LAVRENT'YEV, B.A.; SHILYAYEV, B.A.; SHUTKIN, N.I.; GNUCHEV, S.A., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; LYUDEMAN, K.F., doktor-inzh., prof.; GRUZIN, V.G., kand. tekhn. nauk; BARIN, S.Ya.; POLYAKOV, A.Yu., kand. tekhn. nauk; FEDCHENKO, A.I.; AGEYEV, P.Ya., prof., doktor; SAMARIN, A.M.; BOKSHITSKIY, Ya.M., kand. tekhn. nauk; GARNYK, G.A., kand. tekhn. nauk; MARKARYANTS, A.A., kand. tekhn. nauk; KRAMAROV, A.D., prof., doktor tekhn. nauk; TEDER, L.I.; DANILOV, P.M.

Discussions. Biul. TSNIICHM no.18/19:69-105 '57. (MIRA 11:4)

1. Direktor Ural'skogo instituta chernykh metallov (for Dubrov). 2. Direktor TSentral'nogo instituta informatsii chernoy metallurgii (for Mikhaylov). 3. Nachal'nik nauchno-issledovatel'skogo otdela osobogo konstruktorskogo byuro tresta "Elektropech'" (for Fel'dman). 4. Nachal'nik martenovskoy laboratorii Zlatoustovskogo metallurgicheskogo zavoda (for Danilov, A.M.). 5. Laboratoriya protsessov stalevareniya Instituta metallurgii Ural'skogo filiala AN SSSR (for Sorokin).

(Continued on next card)

DUBROV, N.F.---(continued) Card 2.
6. Ural'skiy politekhnicheskiy institut (for Butakov). 7. Starshiy inzhener Bryanskogo mashinostroitel'nogo zavoda (for Soyfer). 8. Institut elektrosvarki im. Patona AN URSS (for Latash). 9. Nachal'nik TSentral'noy zavodskoy laboratorii "Uralmashzavoda" (for Zamotayev). 10. Dnepropetrovskiy metallurgicheskiy institut (for Sapko). 11. Moskovskiy institut stali (for Yedneral). 12. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Gmuchev, Lapotyshkin). 13. Starshiy master Leningradskogo zavoda im. Kirova (for Rozin). 14. Institut metallurgii im. Baykova AN SSSR (for Novik, Polyakov, Garnyk). 15. Nachal'nik tekhnicheskogo otdela zavoda "Bol'shevik" (for Lavrent'yev). 16. Starshiy inzhener tekhnicheskogo otdela Glavspetsstali Ministerstva chernoy metallurgii (for Shilyayev). 17. Zamestitel' nachal'nika tekhnicheskogo otdela zavoda "Elektrostal'" (for Shutkin). 18. Freybergskaya gornaya akademiya, Germanskaya Demokraticheskaya Respublika (for Lyudeman). 19. Zaveduyushchiy laboratoriyey stal'nogo lit'ya TSentral'nogo nauchno-issledovatel'skogo instituta tekhnologii i mashinostroyeniya (for Gruzin). 20. Starshiy master elektrostaleplavil'nykh pechey Uralvagonzavoda (for Barin). 21. Zamestitel' nachal'nika elektrostaleplavil'nogo tsekha zavoda "Sibelektrostal'" (for Fedchenko). 22. Zaveduyushchiy kafedroy metallurgii stali i elektrometallurgii chernykh metallov Leningradskogo politekhnicheskogo instituta (for Ageyev). 23. Zamestitel' direktora Instituta metallurgii im. Baykova AN SSSR, chlen-korrespondent AN SSSR (for Samarin).

(Continued on next card)

DUBROV, N.F.---(continued) Card 3.

24. Nachal'nik laboratorii TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii (for Bokshitskiy). 25. Zaveduyushchiy kafedroy elektrometallurgii Sibirskogo metallurgicheskogo instituta (for Kramarov). 26. Nachal'nik elektrostaleplavil'nogo tsekha Kuznetskogo metallurgicheskogo kombinata (for Tedor). 27. Nachal'nik elektrometallurgicheskoy laboratorii Kuznetskogo metallurgicheskogo kombinata (for Danilov, P.M.).

(Steel--Metallurgy)

AUTHORS: Chernov, B. G., Ageyev, P. Ya. SOV/163-58-2-7/46

TITLE: Physical and Chemical Fundaments of Metal Melting in Vacuum and Protective Gas Atmosphere (Fiziko-khimicheskiye osnovy plavki metallov v vakuume i v zashchitnoy atmosfere)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 43-49 (USSR)

ABSTRACT: The theoretical basis of the melting methods of metals in vacuum and protective gas atmosphere were discussed. In melting metals consisting of Armco iron and chromium the nitrogen and carbon content of the metal is not affected by the chromium content during the melt. The dependence between the nitrogen concentration and the chromium content of the metal in vacuum melting were investigated. From these investigations may be seen that with an increase of the chromium content in the metal a deterioration of the refining process of the metal from nitrogen in the melting of the alloys occurs. The behaviour of some elements in the metals in their melting in vacuum and protective gas atmosphere was investigated. It was found that when the melting process is carried out in a protective gas atmosphere

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of neutral gases the loss in melting the alloys is practically removed and the production of pure metals of the desired chemical composition is made easier. The changes of the oxygen and nitrogen content in Armco iron at different argon pressure were investigated. Melts in argon atmosphere at low pressure do not lead to a sufficient refining of the metals. There are 5 figures and 2 tables.

ASSOCIATION: Leningradskiy politekhnicheskiy institut (Leningrad Polytechnical Institute)

SUBMITTED: October 1, 1957

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AGEYEV, P. YA.

НЕМЕТАЛЛИЧЕСКИЕ ВКЛЮЧЕНИЯ СТАЛИ

С.И.Поволь Г.Ф.Коновалов	Очистка кипящей стали от тугоплавких включений
С.Е.Волков А.М.Самарин	Влияние метода раскисления стали в индукционной печи на процесс ее десульфурации.
Д.К.Бутаков Л.М.Мельникова	Влияние кислорода на обособление серы в структуре литой стали.
С.Т.Ростовцев Д.И.Туркенич В.Н.Бахтамировский К.С.Простяков	Окисные неметаллические включения в конверторной рельсовой стали.
В.А.Уразов Ю.Т.Лукашевич-Дуванова	Включения в малоуглеродистой стали, содержащей титан.
Ю.Т.Лукашевич-Дуванова О.В.Дымов Е.В.Круглова	Включения в малоуглеродистой стали, содержащей алюминий и ниобий.
А.И.Хохлов	Осаждающее раскисление в процессе электроплавки стали.
С.Г.Воинов П.М.Шалимов	Разработка и внедрение новой технологии выплавки шарикоподшипниковой стали.
В.П.Карасев П.Я.Агеев	Возможные пути ускорения раскисления металла.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow-- 30 Jun 1959.

AGEYEV, P. YA.

ДЕГАЗАЦИЯ СТАЛИ И СПЛАВОВ

М.А.Шумилов П.В.Гельд Ф.А.Сидоренко	Некоторые особенности процесса рассыпания ферросилиция.
Р.А.Рябов П.В.Гельд	Влияние углерода на водородопроницаемость стали.
Г.Н.Окороков А.Ю.Поляков А.М.Самарин	Особенности рафинирования стали при дуговом вакуумном переплаве.
А.М.Самарин М.П.Кузнецов Д.П.Ульянов Л.М.Новик А.Н.Лукутин	Повышение качества бессемеровских рельсов методом вакуумной обработки в ковше.
Г.Н.Ойкс [illegible] Г.А.Соколов В.Н.[illegible] В.З.[illegible]	Новые технологии производства [illegible] стали с применением вакуума.
П.Я.Агеев В.Г.Чернов	Влияние легирующих на поведение кислорода и азота при плавке его в вакууме.
И.В.[illegible] Э.И.[illegible]	Влияние технологических факторов вакуумной дуговой плавки на снижение содержания газов и неметаллических включений в нержавеющей стали.
Т.М.Воробьева Н.П.[illegible] Е.С.[illegible]	Влияние вакуумирования при переливании из ковша в ковш на качество стали 30ХГСНА.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow-- 30 Jun 1959.

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A006/A101

AUTHORS: Ageyev, P.Ya., Karasev, V.P., Shkarednyy, M.V.

TITLE: On the problem of deoxidizing steel with aluminum

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 12, 1961, 15, abstract 12A84 ("Nauchno-tekhn. inform. byul. Leningr. politekhn. in-t", 1960, no. 11, 3 - 6)

TEXT: The simultaneous changes of O and Al content during deoxidation of liquid Fe with aluminum were investigated in a 5 kg laboratory induction furnace with magnesite lining. Melting and holding of the liquid metal were performed in pure argon atmosphere. An amount of 0.3% Al was added to the metal during thorough stirring of the pool with a quartz rod. In all heats a sharp decrease of the O content in the metal was observed immediately after the addition of Al. At an initial O content as high as 0.03% in experimental heats, only about 10% of the Al added are eliminated due to the reduced concentration of O in the metal. Losses of Al on account of Al oxidation on the pool surface did not take place; at such an Al-concentration, evaporation of Al is negligible. Losses of 40% Al, determined during the investigation, are considered to be caused by

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the interaction of Al with Fe oxides of the active layer of the furnace lining. Within the first 6 - 7 minutes of holding the metal, the total O content is reduced to minimum values; during longer holding it does not change or increases slightly; this occurs on account of levelling the rate of O supply and elimination from the metal. Establishing the constancy of the total O content in the metal at this moment does not correspond to an equilibrium state, since the Al concentration varies continuously. The equilibrium state begins after more than 15 minutes. The equilibrium constant of the deoxidation reaction of Fe with aluminum in a magnesite crucible is estimated to be $1 \cdot 10^{-11}$-$0.5 \cdot 10^{-11}$.

Yu. Nechkin

[Abstracter's note: Complete translation]

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S/137/62/000/002/007/14?
A006/A101

AUTHORS: Ageyev, P. Ya., Chernov, B. G.

TITLE: Behavior of composite-alloyed alloy components during melting in vacuum induction furnaces

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1962, 17-18, abstract 2A84 ("Nauchno-tekhn. inform. byul. Leningr. politekhn. in-t", 1960, no. 11, 7-16)

TEXT: The authors investigated the behavior of components on Ni-base alloys with up to 10% Cr content. It was established that after melting of the heat at a pressure as high as 10^{-3} mm Hg the Cr content decreased by 1.96%; this is in a satisfactory agreement with the given calculations. Losses of components in alloys, alloyed with Cr, Al, Ti, Co, W and Mo, were determined in a OKБ-497 (OKB-497) induction vacuum furnace at 1; 5.10^{-2}; 1.10^{-3} mm Hg rarefaction degrees. The liquid metal temperature was measured with an immersion thermocouple and was 1,600°C for the majority of heats. The use of inert gas during melting of the heat reduces losses of alloying elements to minimum values. Cr content is subjected to maximum changes during the holding of the melt under

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